INSECTS OF MICRONESIA
Diptera: Sphaeroceridae (Borboridae)[1]

By O. W. RICHARDS
IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY
LONDON, ENGLAND

INTRODUCTION

The small flies of the family Sphaeroceridae are often widely distributed and many species are now cosmopolitan. This is probably due chiefly to their potentiality of being wind-borne, the species being frequently caught in aerial tow nets (Freeman, 1945, Jour. Anim. Ecol. **14**: 128; Yoshimoto and Gressitt, 1961, Pacific Ins. **3**: 556). They are mostly unspecialized in their breeding habits, the larvae developing in a variety of decaying material, usually vegetable. In view of these facts, the relatively large number of new species found in Micronesia is interesting, but the family has been so little collected in the surrounding regions that this may not be very significant. As far as I know, only two papers contain references to sphaerocerid flies in Micronesia. I recorded four species from Guam (1946) which have all been found again in the present material; and G. E. Bohart and Gressitt (1951), in their paper on the filth-inhabiting flies of Guam, give biological information about one of the above species. The known distribution of Sphaeroceridae in Micronesia, shown in the table, suggests that much more collecting is required to establish the true facts. The nomenclature of the genera and subgenera of this family is very confused but I explain my views in the Catalog of North American Diptera (in press).

The United States Office of Naval Research, the Pacific Science Board (National Research Council), the National Science Foundation, and Bishop Museum have made this survey and the publication of the results possible. Field research was aided by a contract between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences, NR 160-175.

Types are deposited in the United States National Museum (US). I am much indebted to Mr. J. W. Siddorn for photographing a number of wings.

[1] This represents, in part, Results of Professor T. Esaki's Micronesian Expeditions (1936-1940), No. 115.

Distributional List of Micronesian Sphaeroceridae

	Micronesian Island Groups										
				Caroline							
	Bonin	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Kusaie	Marshall	Gilbert	Other Localities
1. Copromyza (Borborillus) marginatis			×								Cosmopolitan
2. Leptocera (L.) curvinervis	×	×									Cosmopolitan, except New Zealand
3. L. (Rachispoda) downesi		×									Great Britain, Hawaii
4. L. (R.) boninensis*	×										
5. L. (R.) disciseta*			×			×	×		×		Malaya
6. L. (R.) subtinctipennis			×	×							Old World tropics
7. L. (R.) sp.				×							
8. L. (Thoracochaeta) fittkaui			×	×							S. Europe, Egypt
9. L. (Pterogramma) conica		×	×				×				
10. L. (Acuminiseta) longiventris		×		×							Vietnam
11. L. (Poecilosomella) punctipennis		×									Old World tropics, Pacific islands
12. L. (Pachytarsella) boharti*		×	×								
13. L. (Limosina) femorina	×	×	×	×			×		×	×	
14. L. (L.) brevicostata var. rufifrons	×										Old World tropics, Pacific islands
15. L. (L.) collinella		×	×								
16. L. (L.) lutea*			×	×							
17. L. (Trachyopella) atomus		×									Europe, Africa
18. L. (T.) obliqua*		×	×	×		×	×		(×)		
19. L. (Coproica) ferruginata		×									Cosmopolitan
20. L. (C.) vagans		×									Cosmopolitan, except Australia and New Zealand
21. L. (C.) hirtula	×	×	×	×	×				×	×	Cosmopolitan

* Described as new.

SYSTEMATICS

KEY TO GENERA AND SPECIES OF MICRONESIAN SPHAEROCERIDAE

1. Veins M_{1+2} and M_{3+4} extending fully pigmented to near wing margin, crossvein m also near margin; anal cell enclosed; mid tibia with at most one or two anterior and dorsal bristles; hind tibia with an apical spur. *Copromyza* (*Borborillus*) 2

   Veins M_{1+2} and M_{3+4} not extending in a pigmented condition appreciably beyond m which is far from wing margin; anal cell open; hind tibia with no apical spur. *Leptocera* 3

2(1). Tomentose spot on bucca clearly separated from eye; arms of genital forceps at right angles to each other .... **Copromyza (B.) sordida** Zett.

   Tomentose spot on bucca narrowly separated from eye; arms of genital forceps parallel to each other .... **1. C. (B.) marginatis**

3(1). Anal vein bent in a gradual curve; scutellum with no discal bristles or else mid trochanter with a strong upcurving bristle 4

   Anal vein nearly always bent in a Z-shaped curve; scutellum entirely covered with small setae; mid trochanter without a long upcurving bristle. Subgenus *Coproica* 19

4(3). Mid trochanter with a strong, upcurving bristle; first costal sector with strong bristles; scutellum with more than four marginal bristles 5

   Mid trochanter without this bristle (except in one South American species); first costal sector with short fine bristles; scutellum with four marginal bristles 6

5(4). Upper part of face in side view protruding in front of eyes; scapular bristles (anterior-most dorsocentrals, lying just behind front margin of scutum) enlarged and curving inward. Subgenus *Rachispoda* 12

   Upper part of face in side view not protruding in front of eyes; no enlarged, incurving scapular bristle. Subgenus *Leptocera* .... **2. Leptocera (L.) curvinervis**

6(4). Eyes reduced and often hairy; frons with at least one large outcurving bristle between interfrontals and superior orbitals; species very small. Subgenus *Trachyopella* 18

   Eyes very rarely reduced (not in Micronesian species); frons without any bristles between interfrontals and superior orbitals 7

7(6). Mid tibia with several sets of paired bristles (antero- and posterodorsals); either mid basitarsus very strongly swollen or wings usually patterned and/or vein R_{2+3} very sharply bent 8

   Mid tibia sometimes with one pair, rarely with two pairs of dorsal bristles; mid basitarsus not so enlarged; R_{2+3} rarely sharply bent 9

8(7). Mid basitarsus very strongly swollen; only one pair of large interfrontal bristles; vein R_{2+3} not sharply bent, posterior outer corner of median cell completely rounded. Subgenus *Pachytarsella* .... **12. L. (Pachytarsella) boharti**

   Mid basitarsus not swollen; two or more pairs of fine interfrontals; vein R_{2+3} sharply bent, posterior outer corner of median cell angled. Subgenus *Poecilosomella* .... **11. L. (Poecilosomella) punctipennis**

9(7). Third antennal segment a little pointed; R_{2+3} short or abdomen broad and flat 10

   Third antennal segment rounded; R_{2+3} nearly always much longer than Rs, abdomen very rarely broad and flat 11

10(9). Small species; R_{2+3} short, hardly longer than Rs; R_{4+5} curving forward; wings patterned; abdomen not flat. Subgenus *Pterogramma*.. **9. L. (Pterogramma) conica**

Moderately large species; R_{2+3} more than three times as long as Rs; R_{4+5} straight; wing not patterned; abdomen broad and flat. Subgenus *Acuminiseta*........................ **10. L. (Acuminiseta) longiventris**

11(9). Dorsocentral bristles short but more than three pairs directed inward and extending to front of scutum; eyes rather small; antennae widely separated and directed outward. Subgenus *Thoracochaeta*.. **8. L. (Thoracochaeta) fittkaui**

Dorsocentral bristles in three pairs or less, not directed inward, and behind suture; antennae nearer together and not so divaricate. Subgenus *Limosina* 15

12(5). R_{4+5} not much bent forward (fig. 1, *c*); disc of scutellum with more than six bristles, including one long pair (fig. 3, *a*).. **3. L. (Rachispoda) downesi**

R_{4+5} strongly bent forward; disc of scutellum with at most four bristles......13

13(12). R_{4+5} less curved (fig. 1, *d*); legs not maculated; scutellum with four pairs of marginal bristles of which third is slightly discal......**4. L. (R.) boninensis**

R_{4+5} more curved (fig. 2); legs maculated..14

14(13). Third pair of scutellar bristles rather weak and only moderately discal; mid tibia at apex with an anterior and a posterior bristle which are longer than width of tibia; wings darker with hyaline band more distinct.. **6. L. (R.) subtinctipennis**

Third pair of scutellar bristles stronger and very distinctly discal, between each third bristle and second nearly always another very fine bristle; anterior and posterior bristles at apex of mid tibia very short .... **5. L. (R.) disciseta**

15(11). R_{4+5} distinctly bent forward; second costal sector distinctly longer than third, not thickened; outer posterior corner of cell distinctly angled, often with a veinlet..16

R_{4+5} straight, at most slightly bent forward; second costal sector not or slightly longer than third; outer posterior corner of cell almost or completely rounded; arista with moderate pubescence; R_{2+3} well removed from costa and moderately curved at end..17

16(15). First costal sector with short bristles; R_{2+3} well removed from costa and quite strongly curved at end; arista with long pubescence; color black, with frons anteriorly and legs more or less reddish.. **14. L. (Limosina) brevicostata var. rufifrons**

First costal sector with bristles rather long; R_{2+3} running close to costa and hardly curved at end; arista with very long pubescence; color almost entirely black..**15. L. (L.) collinella**

17(15). Black species, front of head, often part of pleura, and legs reddish; second costal sector somewhat thickened; male hind femur with a proximal row of short stout ventral bristles..**13. L. (L.) femorina**

Yellow species; second costal sector not thickened; male hind femur without these bristles; genitalia large, anal split horseshoe-shaped, with a long bristle on each side below..**16. L. (L.) lutea**

18(6). Eyes densely haired; several bristles in row between interfrontals and superior orbitals; R_{4+5} very strongly bent forward but R_{2+3} not running very close to costa (fig. 10, *a*); hind tibia with no preapical dorsal bristle..**17. L. (Trachyopella) atomus**

Eyes bare; only one strong bristle on frons between interfrontals and superior orbitals; R_{4+5} less strongly bent forward but R_{2+3} running for some distance very close to costa (fig. 10, *b*); hind tibia with a small preapical dorsal bristle............**18. L. (T.) obliqua**

19(3). Second sector of costa markedly longer than third............20

Second sector of costa scarcely or not longer than third, first sector with short bristles, R_{4+5} bent at least slightly forward; small, all-black species with pale wings............**21. L. (Coproica) hirtula**

20(19). Thorax more or less ferruginous-tinged, wings dark; first costal sector with long bristles; three sternopleural bristles............**19. L. (C.) ferruginata**

Thorax black, wings pale; first costal sector with short bristles; two sternopleural bristles............**20. L. (C.) vagans**



FIGURE 1.—Left wing: **a**, *Copromyza* (*B.*) *marginatis;* **b**, *Leptocera* (*L.*) *curvinervis;* c, *L.* (*R.*) *downesi;* **d**, *L.* (*R.*) *boninensis.*

Genus **Copromyza** Fallén

Subgenus **Borborillus** Duda

1. **Copromyza (Borborillus) marginatis** (Adams). (Figure 1, *a.*)
   Borborus marginatis Adams, 1905, Kansas Univ., Sci. Bull. **3**: 198.
   Borborus marmoratus Becker, 1908, Zool. Mus. Berlin, Mitt. **4**: 133.
   Borborus (*Borborillus*) *marmoratus*, Duda, 1938, IN Lindner, Flieg. Palaearkt. Reg. **57**: 54.

Buccae with no long bristles. Mesoscutum very dull, tomentose, with one humeral, two rows of acrostichals and one pair of dorsocentrals; scutellum with four marginal bristles. Mid tibia with no dorsal or anterodorsal bristles; hind tibia with a rather short anterodorsal bristle at about two-thirds distance from base and a curved apicoventral spine.

DISTRIBUTION: Atlantic islands, Africa, India, Philippines, Caroline Is. (Palau).

PALAU. KOROR: One, at light, Jan. 16, 1953, Beardsley.

This species is close to *C. sordida,* which is in Hawaii, but differs by having a larger tomentose spot on the buccae which is only very narrowly separated from the eye, by having the lower part of the sternopleuron dull, not shining, and by differences in the male genitalia, in particular the male abdominal sternites are much narrower in *marginatis* and the two arms of the genital forceps are parallel to each other and not at right angles.

Genus **Leptocera** Olivier

Subgenus **Leptocera** Olivier

2. **Leptocera (Leptocera) curvinervis** (Stenhammar). (Figure 1, *b.*)

Limosina curvinervis Stenhammar, 1854, K. Sven. Vet.-Akad. Handl. **1853**: 406.

Limosina roralis Rondani, 1880, Soc. Ent. Ital., Bull. **12**:39.

Limosina salatigae de Meijere, 1914, Tijdschr. Ent. **57**: 269 (Java).

Leptocera curvinervis, Duda, 1925, Archiv Naturgesch. **90**A (11): 50.

DISTRIBUTION: Europe, Canaries, Azores, Madeira, Cape Verde Is., Africa, Seychelles, Ceylon, Formosa, Java, New Guinea, Samoa, Micronesia.

BONIN IS. CHICHI JIMA: 102 females, 82 males, Okumura, April 8-15, 1958, Sakaiura, May 12-31, 1958, Omura Beach, April 2-25, May 5-June 9, 1958, Yatsuse R. (Minato ko), April 10-22, 1958, Tatsumi Wan, Southeast Bay, April 11-22, 1958; Ani Jima I., Southwest Bay, May 17, 1958; Nishi Jima, May 22, 1958, all Snyder; Futami-ko, at light, May 10, 1956, Clagg.

S. MARIANA IS. SAIPAN: Six females, four males, As Mahetog area, April 30, 1945, Dybas; 1 to 2 miles east of Tanapag, Jan. 10, 1945, Dybas. GUAM: 34 females, 17 males, Oca Pt., June 6, 1945, Dybas; Fadang, June 3, 1945, Dybas; Merizo, Oct. 1957, Krauss; Barrigada, Oct. 1957, Krauss; Nimitz Hill, May 4, 1956, Clagg; Nimitz Beach, Aug. 1952, Krauss; Ritidian Pt., light trap, Aug. 1, 1945, Gressitt; Mt. Santa Rosa, June 1945, Bohart and Gressitt.

Within the subgenus *Leptocera* s.s. the present species is recognized by having the acrostichals not enlarged (not or scarcely larger than the notal microchaetae) and in having on the mid tibia a long apical posterior bristle which usually lies along the posterior side of the basitarsus. There is a very much shorter corresponding bristle on the anterior side of the tibia. The three closest species are *L. pararoralis* Duda (1925) from North America, *L. neocurvinervis* Richards (1931), and *L. mendozana* Richards (1931), both

from Argentina. None of these species have the long posterior bristle at the apex of the mid tibia.

Many specimens were recorded from beaches, others were taken in light traps or by sweeping. It is curious that the species was not detected on Guam by Bohart and Gressitt. However, it is not strictly a filth-inhabiting fly, but is usually found in somewhat damp situations, sometimes on agricultural land or in marshes, under low vegetation.

Subgenus **Rachispoda** Lioy

3. Leptocera (Rachispoda) downesi Richards (figs. 1, *c;* 3, *a*).

Leptocera downesi Richards, 1944, Roy. Ent. Soc. London, Proc. B, **13**: 137, figs. 1-7.

Limosina (*Collinellula*) *downesi* Richards, 1952, Hawaiian Ent. Soc., Proc. **14**: 430.

DISTRIBUTION: Great Britain, Hawaii, Micronesia.

S. MARIANA IS. GUAM: Two females, on Philippine clipper, April 17, 1939, R. G. Oakley.

L. downesi is easily recognized among the species of the group of *L.* (*R.*) *fuscipennis* (Haliday), which have numerous small setae on the disc of the scutellum, by the pair of long discal bristles which are quite distinct from the eight marginals, of which two on each side are enlarged. The species was described from flies bred from sprouting wheat in the hold of a ship in Glasgow and is perhaps of South American origin; the Hawaiian species were obtained out of doors. The scutellum, wings, male genitalia, female spermathecae, and some details of the puparium are illustrated with the original description.

4. Leptocera (Rachispoda) boninensis Richards, n.sp. (fig. 1, *d;* 3, *b*).

Male, female: Blackish brown. Mesoscutum with some yellowish-brown dusting; abdomen more shining. Frons anteriorly and buccae in part reddish-tinged. Segments of legs mostly paler. Halteres pale yellowish; wings fuscous with poorly defined hyaline patches across r-m and across ends of R_{2+3} and m. Length 1.7-2.0 mm. (males smaller than females).

Face in profile not projecting much in front of eyes, but with a fairly well marked nose-like process between antennae. Buccae with one bristle half as long as vibrissa. Arista five times as long as antenna, with long pubescence. Three pairs of dorsocentrals behind suture, markedly decreasing in size anteriorly; scapular bristle (very anterior, inwardly directed dorsocentral) smaller than usual and not always easy to see; shorter of two humeral bristles directed inward and rather resembling scapular; acrostichals very small, in two adjacent rows, scarcely larger than the other microchaetae. Scutellum with four marginal bristles on each side, as usual second and fourth (apical) large and third slightly more discal than others. One large and one small anterior sternopleural bristle. Fore legs with usual structure. Mid legs with strong upcurving bristle on trochanter, femur with about five anterior bristles of which last is longer on distal one-fourth, mid tibia with a pair of strong bristles at one-fifth distance from base, surmounted by a smaller pair, a

strong pair at four-fifths from base with some smaller bristles almost at same level, a small anteroventral near center and strong preapical ventral, anterior and posterior apicals longer than width of tibia, mid basitarsus with a strong ventral bristle. Hind tibia with two or three dorsal bristles a little enlarged, tarsi normal, segment 2 much longer than 1. Wings as in figure 1, *d*.

Abdomen with short bristles only, even longer lateral bristle not as long as individual tergites. Female with tergites 6 and 7 forming complete rings, though in 7 very narrow, beyond it a shining central plate whose margin is centrally a little emarginate and laterally produced into slight rounded lobes which each bear one moderate downcurved bristle and several shorter ones; on each side of central plate a more or less triangular, duller plate bearing one long curved bristle and a few shorter ones. Male sternite 5 simple without emargination or modified bristles; hypopygium small, bristles along edges of anal split short and not dense, forceps produced into a short black hook, curving inward and somewhat dorsally, between this and sternite 5 a narrow black pointed spike protrudes on each side, directly obliquely forward and lying on sternite 5.



FIGURE 2.—*Leptocera* (*R.*) *disciseta*, left wing.

Holotype, male (US 66298), Chichi Jima, Ani Jima, Southwest bay, May 17, 1958, Snyder; allotype, female, same data. Paratypes: Female, Haha Jima, Okimura, April 26-May 9, 1958, Snyder; two males, Chichi Jima, Ogiura, April 8-May 12, 1958, Snyder; male, two females, Chichi Jima, Omura, "Camp Beach," May 5-June 9, 1958, Snyder.

DISTRIBUTION: Bonin Is.

This species runs in Duda's key (1925, p. 15) to *L.* (*C.*) *subtinctipennis* (Brunetti), but differs in having R_{4+5} less curved (compared with Duda's figure 2), in not having much red on the anterior frons, and in not having maculated legs.

5. **Leptocera (Rachispoda) disciseta** Richards, n. sp. (figs. 2; 3, *c*).

Male, female: Blackish brown, mesoscutum dusted with traces of four longitudinal lines, inner pair just bordering the acrostichals. Anterior part of frons, face in part, buccae, lower edge of antennal segment 3, and some marks on pleura, more or less reddish. Legs with tibiae and tarsi pale, mid and especially hind tibiae with two darker rings. Wings maculated, in general hyaline with the area between costa and R_{2+3}, two spots on R_{4+5} and a spot at end of median cell more or less connecting, with proximal spot on R_{4+5} darker. Halteres whitish. Length 1.4-1.7 mm.

Face in profile not projecting much in front of eyes but with a well-marked, nose-like process between antennae. Largest bristle on buccae not more than one-fourth length of vibrissa. Arista five times as long as antenna with long pubescence. Three pairs of dorsocentrals behind suture, not decreasing much in size anteriorly, foremost one almost on suture, scapular bristle small and scarcely larger than inner, inwardly directed humeral; acrostichals very small, in two adjacent rows, scarcely larger than the other microchaetae. Scutellum with 10 bristles; on each side of margin a small basal, a moderate subbasal, and a long apical; at about same level as subbasal (and arising half way between it and midline) a moderate bristle, representing usual third marginal bristle, half as long as subbasal; between this and subbasal, another fine bristle of same size as basal. One large and one small anterior sternopleural bristle. Fore legs with usual structure. Mid legs with strong upcurving bristle on trochanter, no distinct bristles on anterior side of femur except moderate apical bristle corresponding to stronger posterior one, mid tibia with a pair of strong bristles at one-fifth from base surmounted by a smaller pair, a strong pair at four-fifths from base with a moderate posterodorsal at about same level and one or two minute bristles above large anterodorsal, a small ventral half way and a strong preapical ventral, basitarsus with a moderate ventral bristle. Hind tibia with two or three dorsal bristles

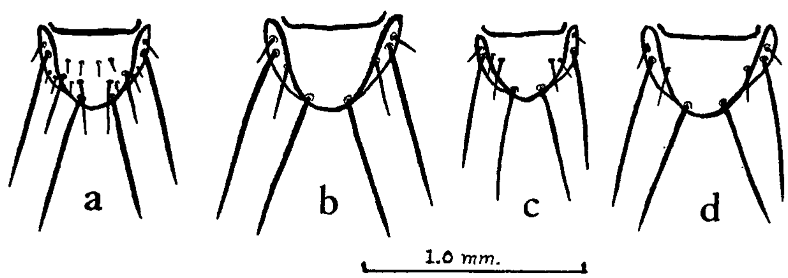


FIGURE 3.—Scutellum: **a**, *Leptocera* (*R.*) *downesi;* **b**, *L.* (*R.*) *boninensis;* **c**, *L.* (*R.*) *disciseta;* **d**, *L.* (*R.*) *subtinctipennis.*

a little enlarged, tarsi normal, segment 2 much longer than 1. Wings as in figure 2. Abdomen with short bristles only, even lateral bristles much shorter than individual tergites. Female with tergites 6 and 7 forming complete narrow rings, plates beyond 7 fused or very closely approximated, central one shining, none bearing any long bristles. Male sternite 5 shallowly but subangularly emarginate with edge of emargination bordered by moderately close short bristles; hypopygium not large, parts bordering anal split often yellowish, anal split bordered by rather dense short bristles which become denser at ventral margin, forceps not visible, but one specimen has a pair of anteriorly directed divergent black spikes, much as in *L. boninensis* Richards.

Holotype, male (US 66299), Ponape, Colonia, June-Sept. 1950, Adams; allotype, female, same data. Paratypes:

PONAPE. COLONIA: Male, female, Nov. 15, 1953, Beardsley, Aug. 1956, Wheeler; female, Agric. Expt. Sta., June-Sept. 1950, Adams; female, Sokehs (Jokaj) I., sweeping roadside vegetation, Feb. 26, 1948, Dybas.

TRUK. TON: Female, Pata, Sabote-Epin, Apr. 10, 1940, Yasumatsu and Yoshino.

PALAU. KOROR: Five males, four females, Mar. 15-Apr. 20, 1953, Beardsley; July 20-22, 1953, Beardsley, Apr. 29-May 2, 1957, Sabrosky. BABEL-

THUAP: Female, Ulimang, Dec. 16, 1947, Dybas; three males, three females, Ngiwal, May 20, 1957; three males, three females, Ngaremlengui, June 1-3, 1957; two males, three females, Ngerehelong, May 7, 8, 1957; female, Ngardmau, May 10, 1957; female, Ngerkabesang I., Apr. 25, 1957, all by Sabrosky.

MARSHALL IS. MAJURO: Male, Aug. 28, 1946, Townes.

DISTRIBUTION: Malaya (Kuala Lumpur), Caroline Is., Marshall Is.

The Majuro specimen lacks the small bristle on the scutellum between the discal and sub-basal; apparently it was not broken off. Of the Palau specimens, three females have two fine bristles on one side and a female has the fine bristle missing as in the Majuro specimen. Three females from Kuala Lumpur, Malaya (1937, in padi seedling, H. T. Pagden) also run to this species.

This species run in Duda's key (1925, p. 15) to *L.* (*C.*) *subtinctipennis* (Brunetti), but differs in that the scutellum has the third bristle discal instead of lateral and has another small bristle between the third and the second so that there are 10 in all. It also lacks the equal anterior and posterior bristles at the end of the mid tibia. From *L. boninensis* it differs not only in the scutellum but in the more curved R_{4+5} and the maculated legs. *L.* (*C.*) *decimsetosa* Richards (1931) from South America has the scutellar bristles marginal.

6. **Leptocera (Rachispoda) subtinctipennis** (Brunetti). (Figure 3, *d.*)

Limosina subtinctipennis Brunetti, 1913, Indian Mus., Rec. **8**: 174.

Leptocera (*Collinella*) *subtinctipennis,* Duda, 1925, Archiv Naturgesch. **90**A (11): 37, fig. 2.

Leptocera (*Rachispoda*) *subtinctipennis,* Richards, 1931, Mission sci. de l'Omo **4**: 384.

Male, female: Blackish brown; thorax and around bristle bases on head dusted with whitish gray. Anterior half of frons, buccae, and part of face, most of antennae, orange. Legs and some marks on the pleura light brown, tibiae with two darker rings. Wings light fuscous with rather less than basal half and band before apex whitish hyaline; halteres whitish. Length 1.4-1.6 mm.

Resembles *L. disciseta* Richards in structure except for following particulars: scutellum with eight bristles; on each side of margin a small basal, a moderate sub-basal, and a long apical; clearly behind sub-basal and in a discal position, though only one-fourth distance between margin and mid line, a fine third bristle, not more than twice as long as fine basal. (In two females another fine bristle, as in *L. disciseta,* between this and margin on one side only.) Mid legs with upcurving bristle on trochanter considerably weaker than usual in this subgenus, mid tibia with an antero- and posterodorsal bristle at extreme apex, considerably longer than width of tibia but not much more than half as long as one of long bristles at four-fifths from base, bristle beneath basitarsus rather weak. Wings essentially as in figure 2. Abdomen in female with two, rather long, crossing bristles arising near base of shining central apical plate. Male sternite 5 shallowly emarginate and bordered with long bristles which almost form a tuft on each side; hypopygium with rather denser but shorter bristles, ending below anal split with a pale lobe-like process on each side, that on left bearing one, that on right bearing two, small hook-like processes which are basally pale but blackened at tips; beneath these lobes lie a pair of long, fine diverging, pale black-tipped spikes.

DISTRIBUTION: Africa, India, Viet Nam, Formosa, Java, Micronesia.

PALAU. NGAIANGL: Three males, six females, at light, May 9, 1957, Sabrosky. BABELTHUAP: Male, three females, Ngiwal, along streams, May 20, 1957; male, Ngaremelengui, June 1, 1957; nine females, Ngerehelong, May 7, 1957; female, Melekeiok, May 24, 1957; all by Sabrosky.

YAP. YAP: Male, four females, Gagil District, July-Aug. 1960, Goss; male, Ruul Distr., July-Aug. 1950, Goss; male, Weloy, over rotting breadfruit, June 15, 1957, Sabrosky. RUMUNG I.: Four males, six females, June 17-21, 1957, Sabrosky.

This species is very close to *L. disciseta* but differs as follows: the third marginal bristle is not as discal, arising from the position of the additional fine one of *L. disciseta.* In size the third marginal is stronger than the fine additional bristle but weaker than the discal bristle of *L. disciseta.* Further, the anterior and posterior bristles at the end of the mid tibia are enlarged and a little longer than the width of the tibia instead of much shorter. The wings are a little darker so that a well-marked hyaline band is left just beyond cross vein m and the end of R_{2+3}. The male sternite 5 has longer marginal bristles but the genitalia seem to be of the same general type with two long spikes.

Duda does not mention the discal position of the third marginal bristle; however, the African specimens which I examined in 1931 show the character.

According to Duda (loc. cit.), who saw the types, *Limosina nebulosa* de Meijere (1916, Tijdschr. Ent. **59**: 211, pl. 7, fig. 13) is a synonym of *L. subtinctipennis* (Brunetti). Through the kindness of Dr. G. Kruseman of the Amsterdam Museum, I, also, was able to examine the types. They are one male, five females on one mount, labeled "Tjibodas, 5000-6000′ (*Koningsberger*) 1913. *Limosina nebulosa* det. de Meijere. Type." The species is very close to *L. subtinctipennis* and has a similar scutellum and mid tibia, but is distinct. The legs are reddish brown and not distinctly maculated. The wings are very similar but the second costal segment is a little longer, not equal to the third. The female lacks the pair of long crossed bristles arising on each side of the shining area of the last dorsal plate. The male genitalia have less dense hairs, with the genital forceps broader, not bearing small hook-like processes; the pair of long spike-like processes is paler, longer, and bent backward so as to curve beneath the forceps.

7. Leptocera (Rachispoda) sp.

One specimen of what may be a new species was obtained on Yap (male, Rumung I., June 17, 1957, Sabrosky). In Duda's key (1925, p. 15) it would run to couplet 14 but the bristles of the mesoscutum are damaged and I cannot go further with it. There are two small basal bristles on each side of the scutellum.

Subgenus **Thoracochaeta** Duda

8. **Leptocera (Thoracochaeta) fittkaui** (Remmert). (Figures 4, *a*; 5, *a*.)
Limosina fittkaui Remmert, 1955, Zool. Jahrb. Syst. **83**: 471, fig. 14.

DISTRIBUTION: Southern France, Egypt (Red Sea coast), Caroline Is.

PALAU. PELELIU: Female, west coast, sift algae on beach, Feb. 2, 1948, Dybas; female, north end, at light, May 28, 1957, Sabrosky. NGURUKDABEL: Male, on beach, Apr. 24, 1957, Sabrosky.

YAP. YAP: Male, 10 females, July-Aug., 1950; female, Kanif, July 30, 1950; male, female, Dugor, Aug. 14, 1950, all by Goss. RUMUNG: Two males, July 9, 1950, Goss; female, at light, June 19, 1957, Sabrosky.

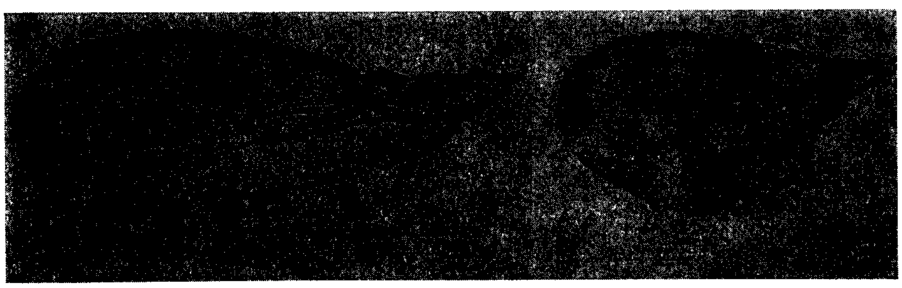


FIGURE 4.—Left wing: **a**, *Leptocera (T.) fittkaui;* **b**, *L. (P.) conica.*

This species was described from Hurghada on the Red Sea coast of Egypt and is very close to *L. brachystoma* (Stenhammar). Some of the original material was sent to me in 1954 by Dr. K. Strenzke and I thought that it fell within the range of the cosmopolitan *L. brachystoma,* which is recorded from England, North Germany, Juan Fernandez, and New Zealand. Going over the rather scanty material available to me, it seems that the two forms may well be distinct though more extended study would be desirable. They may be separated as follows:

L. fittkaui	L. brachystoma
Dorsocentrals 1.5-2.0 times as long as scutal microchaetae.	Dorsocentrals 2.0 times as long as scutal microchaetae.
Scutellar bristles shorter, basal bristle not much longer than longest dorsocentral, apical bristle not or hardly longer than scutellum.	Scutellar bristles longer (fig. 5, *b*); basal bristle clearly longer than longest dorsocentral, apical bristle distinctly longer than scutellum.
First sector of costa with 3 to 5 short, finer outer bristles and 2 to 3 inner bristles.	First sector of costa with 2 to 3 outer, 2 to 3 inner, stronger bristles.
Second sector (between first and second costal breaks) with 4 to 5 short and fine outer bristles and 2 inner bristles which are only a little stronger.	Second sector with 2 to 3 outer bristles which are not much weaker than 2 to 3 inner bristles.

Dr. H. Remmert was unable to cross the two forms, and noted the following biological differences: *L. fittkaui* hardly ever flies; it greatly preferred *Fucus* to powdered nettle leaves with salt water added for either feeding or oviposition and the larvae do not develop satisfactorily on the second medium. *L. brachystoma,* on the other hand, flies freely and is much more tolerant of the medium made of powdered nettle leaves and salt water. He also found some small differences in the chaetotaxy.

Subgenus **Pterogramma** Spuler

9. Leptocera (Pterogramma) conica Richards (fig. 4, *b*).

Leptocera (*Poecilosomella*) *conica* Richards, 1946, Roy. Ent. Soc. London, Proc. B, **15**: 130.

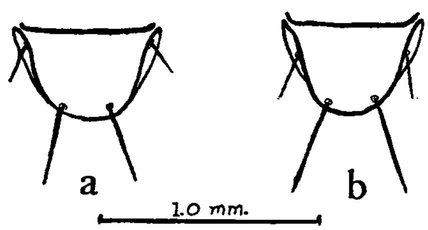


FIGURE 5.—Scutellum: **a**, *Leptocera* (*T.*) *fittkaui;* **b**, *L.* (*T.*) *brachystoma.*

DISTRIBUTION: S. Mariana Is., Caroline Is.

S. MARIANA IS. GUAM: Female, Piti, Apr. 28, 1948, Maehler; male, Umatac, Mar. 28, 1936, Bryan; male, Sumay Rd., July 15, 1936, Swezey. SAIPAN: Male, As Mahetog area, sifted from *Pandanus* fruit, Mar. 4, 1945, Dybas.

PALAU. BABELTHUAP: Male, Ulimang, Dec. 1, 1947, Dybas; six males, two females, wooded valley west of Ulimang, Dec. 21, 1947, Dybas; male, female, Melekeiok, May 23-24, 1957, Sabrosky.

PONAPE. Male, Net District, Nanpil, Mar. 13, 1948, Dybas.

This species was described from a single male captured on Guam; both sexes have now been found in the Carolines. The female differs from the male as follows: mid femur without the antero- and posteroventral rows of short bristles originally described as a dense tuft of bristles, apicoventral bristle of mid tibia longer; cerci each with two long, somewhat sinuous bristles and a few short ones. In both sexes, the lower margin of the eye is distinctly emarginate.

L. conica clearly belongs to Duda's subgenus *Mallochella* and runs down in his key (1952, p. 104) to *L.* (*M.*) *poeciloptera* Malloch (1914) of Costa

Rica. The anterior dorsocentral, however, is not longer than the prescutellar one and the wing pattern differs. It seems probably that *Pterogramma* Spuler is the correct name for this group. Hitherto all the species have been recorded from the warmer parts of America, mostly Central America.

Subgenus **Acuminiseta** Duda

10. Leptocera (Acuminiseta) longiventris Duda (fig. 6, *a*).

Leptocera (Acuminiseta) longiventris Duda, 1925, Archiv Naturgesch. **90**A (11): 126 (female).

Female: Shining black, with slight brownish tomentum on mesoscutum; frons anteriorly, antennae, and face somewhat brownish; pleura with some pale marks. Legs dark brown with tarsi yellow brown; halteres black with yellow stalk; wings nearly hyaline. Length about 1.75 mm.

Dorsal part of face a little prominent; antennal segment 3 a little pointed, arista four times as long as antenna with moderately long pubescence; one pair of fine interfrontal bristles and in front of them one very strong pair (almost crossing); postvertical bristles unusually small and separated by five times as much as posterior ocelli, other head bristles normal. Humeral bristle short, two pairs of short dorsocentrals, microchaetae rather widely spaced, about six rows between anterior dorsocentrals, four short scutellars, sternopleural a minute hair. Mid tibia with a pair of bristles at one-fourth from base, anterodorsal surmounted by a very small one, a moderate dorsal one at four-fifths from base with one small, and one very small anterodorsal just above it, and an apical ventral one; mid basitarsus with rather coarse short setae but no long bristle; hind tibia with no long bristles and no apical spur; hind basitarsus not so broad as usual, half as long as second segment. Wing (fig. 6, *a*) with essentially the venation of *Ceroptera* Meigen (M_{1+2} produced nearly to margin though thin and M_{3+4} markedly produced beyond cell, anal vein long). Abdomen with short bristles only, unusually broad, sharp-edged, sternites very broad, anal segments visible in a widely transverse slit. Male not seen.

DISTRIBUTION: Vietnam (Annam), S. Mariana Is., Caroline Is.

S. MARIANA IS. GUAM: Female, Sumay, in China Clipper, Sept. 15, 1938, Oakley.

YAP. YAP: Two females, Rumung I., June 17, 19, 1957, Sabrosky.

Specimens were compared with one of Duda's two original females, kindly sent to me from the Naturhistorische Museum, Wien, by Dr. M. Beier. The group *Acuminiseta* is in need of further study and is not easy to separate from the subgenus *Anommonia* Schmitz, the species of which are associated with ants. Seven species have been described, but apart from *L. pallidicornis* Villeneuve which has been collected several times in west Africa on the backs of julid millipedes, the others are known from only one or two specimens each. It will be better to give the characters of the Micronesian species rather than those of the subgenus. This species is transitional to the genus *Ceroptera* Meigen and has very similar venation but lacks the small spur at the apex of the hind tibia. Many species of *Ceroptera* have their tarsi modified for holding on to the backs of dung-rolling scarabaeids but the genus is heterogeneous and difficult to define.

Subgenus **Poecilosomella** Duda

11. **Leptocera (Poecilosomella) punctipennis** (Wiedemann). (Figure 6, *b.*)

Borborus punctipennis Wiedemann, 1824, Analecta ent., 59; 1830, Aussereur. Zweifl. Ins. 2: 599.

Leptocera (*Poecilosomella*) *punctipennis,* Duda, 1925, Archiv Naturges. (1924) **90**A (11): 95, fig. 12.

Head with 2 to 3 interfrontal bristles. Wing not banded but with some spots; costa with very short setae and not extending beyond R_{4+5}; R_{2+3} not angularly bent and without a veinlet at bend; halteres yellow. Tarsi yellowish with last two segments and ventral side of first two segments of hind tarsi black or dark brown; mid tibia with anterodorsal bristle at upper end of lower of two dark rings; male fore femur with dense pubescence but without velvety-black tomentum, mid tibia internally with long pubescence which is partly feather-like.

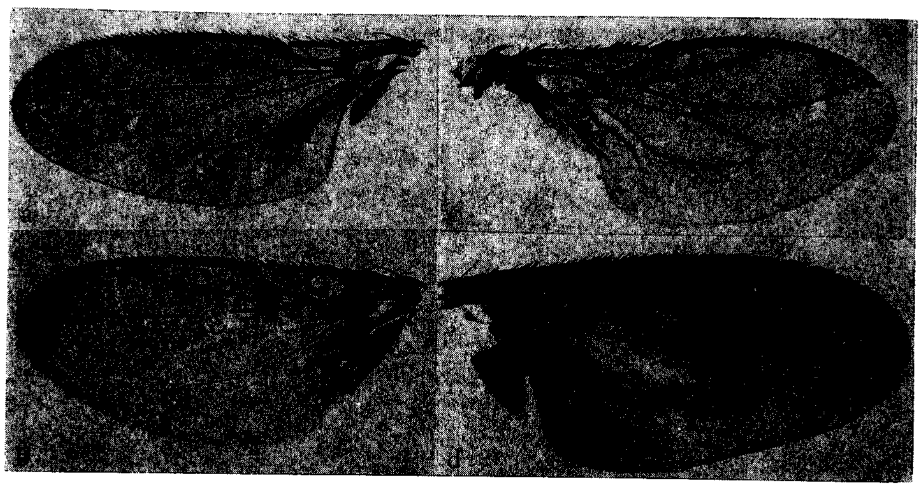


FIGURE 6.—**a**, *Leptocera* (*A.*) *longiventris,* left wing; **b**, *L.* (*P.*) *punctipennis,* left wing; **c**, *L.* (*P.*) *boharti,* right wing; **d**, *L.* (*P.*) *pachypus,* right wing.

DISTRIBUTION: Belgian Congo, India, Indo-China, Formosa, S. Mariana Is., Caroline Is., Hawaii, Samoa.

S. MARIANA IS. GUAM: Female, Barrigada, Oct. 1957, Krauss.

PALAU. BABELTHUAP: 11 males, 12 females, Ngerehelong, along streams, May 5-7, 1957, Sabrosky; three males, two females, Melekeiok, May 24, 1957, Sabrosky; eight males, seven females, Ngaiangl Atoll, some at light, May 9, 1957, Sabrosky.

YAP. YAP: Female, Oct., 1952, Krauss; female, Weloy, June 14, 1957, Sabrosky. RUMUNG: Three females, June 17-19, 1957, Sabrosky.

Subgenus **Pachytarsella** Richards, n. subgen.

Nearest to subgenera *Poecilosomella* Duda and *Limosina* Macquart, but with thickened legs, especially noticeable on mid and hind tarsi.

Only one pair of unusually strong interfrontals; antennal segment 3 a little pointed; thorax with two posterior pairs of dorsocentrals; scutellum bare with 4 marginals; mid trochanter with no long upcurved bristle; mid tibia with 5 to 7 anterodorsal and 4 to 6 posterodorsal bristles which are relatively short, no mid ventral, a strong apicoventral; tarsus, especially basitarsus, thickened, basitarsus with short stout bristles; hind tibia with no apical spur; hind tarsi, especially first two segments, considerably widened; wings (fig. 6, *c, d*) with no long costal bristles after base, posterior corner of median cell completely rounded; anal vein gently curved; abdominal tergites considerably desclerotised.

Type of the genus is *Leptocera* (*Limosina*) *pachypus* Richards (1956, Hawaiian Ent. Soc., Proc. **16**: 135), by present designation.

In Duda's key to the subgenera (1938, p. 20) *Pachytarsella* runs to subgenera *Biroella* Duda and *Poecilosomella* Duda, but differs in the thickened legs and very different venation. A dorsally desclerotised abdomen occurs in *Ceroptera* Meigen subgenus *Ceropterella* Richards but the hind tibia in that genus has a small apical spur.

The first specimen of this subgenus was sent to me by Bohart in 1946 from Guam but it was destroyed in the post on the return journey and the description was not published. Later, specimens of the very similar *L. pachypus* Richards were sent to me from Hawaii. In the present material, one female from Palau agrees closely with my description of the Guam specimen but differs a little from paratypes of *L. pachypus.* I propose to describe the Micronesian specimens as a new species.

12. **Leptocera (Pachytarsella) boharti** Richards, n. sp. (figs. 6, *c*; 7, *a*).

Female: Black; antennae, tibiae and tarsi brown, proximal two-thirds of hind tibia sometimes darker, first two segments of hind tarsus paler. Halteres pale; wings hyaline. Length about 2.0 mm.

Face somewhat prominent dorsally and in side view projecting in front of eyes. Antennal segment 3 much wider than long and a little pointed distally, arista five times as long as antenna, with moderate pubescence. Interfrontals represented by one pair of strong bristles which just cross; vibrissa long, and largest buccal bristle less than half as long. Mesoscutum with one humeral, two posterior pairs of dorsocentrals, numerous close rows of microchaetae; scutellum about semicircular with four marginal bristles of which the apicals are longer; two very small sternopleurals. Wings as in figure 6, *c*. All legs somewhat thickened; fore femur with the usual posteroventral row of bristles, fore basitarsus a little wider than usual. Mid trochanter with a short bristle only, mid femur with no conspicuous bristles except an anterior apical; mid tibia with 7 to 8 anterodorsal and 5 to 6 somewhat smaller posterodorsals, no mid ventral, a long apicoventral; mid tarsus (fig. 7, *a*) widened and thickened, shorter than tibia, basitarsus with short stout black setae antero- and posterodorsally as well as ventrally but with no long bristles. Hind tibia distinctly thickened, about five of posterodorsal setae distinctly lengthened, tarsi widened and shortened, fifth segment without conspicuous dorsal bristles. Abdomen with bristles on tergites 1 + 2 and 3 short, longer on hind margins of 4 to 7 which are considerably abbreviated at sides; segment 8 with two large lateral triangular plates between which lie glabrous, more or less crescentic, cerci; sternites normal and moderately broad, last sternite deflected upward.

Holotype, female (US 66300), Palau, Peleliu I., July 28, 1945, Hagen (in alcohol).

Other specimens. Guam: female, Pago, Oct. 27, 1945, G. Bohart (specimen lost).

DISTRIBUTION: S. Mariana Is., W. Caroline Is. (Palau).

Differs from *L. pachypus* Richards (1956) as follows: face rather more projecting; wing with second costal sector not distinctly longer than third (as in figure 6, *c*, not *d*); legs thicker, mid tarsi not as long as tibia, basitarsus shorter and thicker (as in figure 7, *a*, not *b*); hind tibia with some posterodorsal setae enlarged, fifth segment of tarsi without 4 to 5 curved dorsal setae; abdominal tergites apparently more nearly normal.

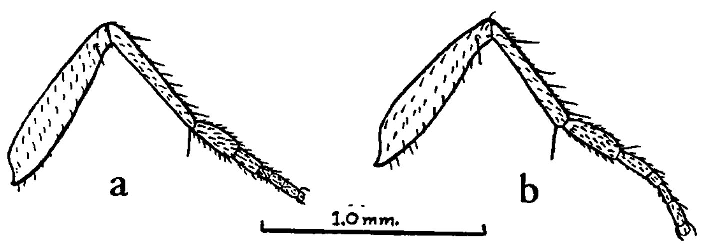


FIGURE 7.—Left middle leg, anterior view: **a**, *Leptocera (P.) boharti;* **b**, *L. (P.) pachypus.*

Subgenus **Limosina** Macquart

13. Leptocera (Limosina) femorina Richards (fig. 8, *a*).

Leptocera femorina Richards, 1946, Roy. Ent. Soc. London, Proc. B, **15**: 129.

DISTRIBUTION: Bonin Is., S. Mariana Is., Caroline Is., Gilbert Is.

BONIN IS. CHICHI JIMA: Three males, Omura, Sept. 18, 1934, Okabe.

S. MARIANA IS. SAIPAN: Male, Donnay (Donni)-Sadog Tasi, May 7, 1940, Yasumatsu and Yoshida. GUAM: Five males, Tamuning, on weeds in pig pens, Oct. 4, 1945, Gressitt and Bohart; four males, Agana, May 23, 1945, Aug. 4, 1945, Gressitt and Bohart; female, Oca Pt., May, 1945, Gressitt and Bohart, male, June 2, 1945, Dybas; six males, two females, Piti Hills, ex carabao dung, Aug. 24, 1936, Swezey; female, Tarague, Apr. 19, 1936, Bryan; two males, Yona, Oct. 1952, Krauss; female, Metizo, Oct. 1957, Krauss.

PALAU. KOROR: Male, at light, Apr. 29, 1957, Sabrosky.

YAP. YAP: Two males, three females, hill behind Yaptown, light trap, 60 m., Nov. 29, 1952, 50 m., Dec. 2, 1952; Gressitt; two females, Giliman, at light and in pig pen, June 12, 1957, Sabrosky.

PONAPE. Female, Colonia (Kolonia)-Dolen Eireke (Sankaku Yama), July 14, 1939, Esaki.

MARSHALL IS. MAJURO: Female, Uliga I., Aug.-Sept. 1955, Wheeler.

GILBERT IS. TARAWA: Female, Bairiki I., Dec. 1957, Krauss.

There is also a female from Palau (Koror, at light, July 10-12, 1953, Beardsley) which may belong to this species, but it is in bad condition.

This species, described from specimens collected on Guam, is one of the commonest and most widespread in Micronesia. Characters not noted in the original description are wings with the second sector of the costa unusually thick and setae on the inside of the hind tibia a little denser toward the tip.

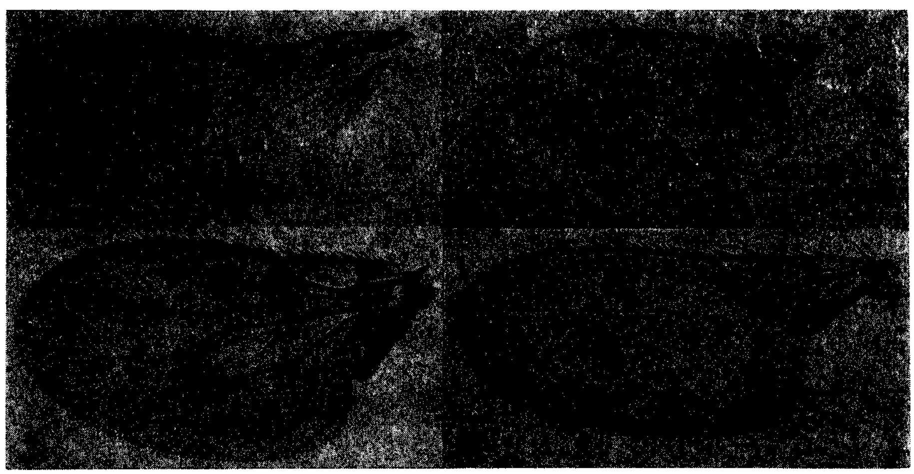


FIGURE 8.—Left wing: **a,** *Leptocera* (*L.*) *femorina;* **b,** *L.* (*L.*) *brevicostata rufifrons;* **c,** *L.* (*L.*) *collinella;* **d,** *L.* (*L.*) *lutea.*

If taken to couplet 41 and not to 48 in Duda's key (1925, p. 153), it runs rather well to *L. rufa* Duda, 1925, but differs from that species in having only the front half of the frons reddish and in having R_{4+5} straighter. Duda's species was described from a single female taken in Formosa. [*Leptocera* (*Scotophilella*) *rufa* Duda, Sept. 1925, is preoccupied by *Leptocera* (*Thoracochaeta*) *rufa* Spuler, May 1925.]

According to Bohart and Gressitt (1951, p. 83) *L. femorina* is found abundantly on Guam in excrement and decaying vegetable matter. The species was bred from fresh cattle droppings, moist cow manure heaps, and decaying aquatic vegetation.

14. Leptocera (Limosina) brevicostata var. rufifrons Duda (fig. 8, *b*).

Leptocera (Scotophilella) brevicostata var. *rufifrons* Duda, 1925, Archiv Naturgesch. 90A (11) : 164, 188 (1924).

Frontal area and buccae more or less reddish, face shining black; antennal segment 2 yellow beneath, segment 3 black. Wing with R_{4+5} meeting costa well before tip of wing but not much curved; costa ending at R_{4+5}. Hind tarsi wider than usual.

DISTRIBUTION: Ethiopia, Belgian Congo, India, Formosa, Malaya, Bonin Is., Hawaii, New Guinea.

BONIN IS. HAHA JIMA: Two males, two females, Okimura, Apr. 26-May 9, 1958, Snyder.

The variety is very likely a species distinct from the typical form which is known from Europe.

15. Leptocera (Limosina) collinella Richards (fig. 8, *c*).

Leptocera collinella Richards, 1946, Roy. Ent. Soc. London, Proc. A, **15**: 129.

Wing with longer bristles than usual on first sector of costa; R_{2+3} forming a very acute angle with costa; R_{4+5} meeting costa well before tip of wing, distinctly curved forward. Mid tibia with a large bristle at one-third from base surmounted by a smaller pair, a large dorsal bristle at three-fourths from base with a large posterodorsal a little above it and two small, more anterior bristles a little higher still, ventrally with long central and apical bristles.

DISTRIBUTION: S. Mariana Is. (Guam), W. Caroline Is.

PALAU. KOROR: Two males, two females, Jan. 28, Mar. 15, Apr. 18-20, July 15, 16, 1953, Beardsley.

16. Leptocera (Limosina) lutea Richards, n. sp. (fig. 8, *d*).

Male, female: Testaceous yellow; antennal segment 3 dorsally and a small pleural spot, darker; sometimes traces of three darker lines on thorax, and abdomen sometimes rather darker. Length about 1.0 mm.

Surface generally shining but area between frontal triangle and orbits duller. Face in profile not projecting, bases of antennae approximated. Strongest bristle on buccae only one-fourth as long as vibrissa. Arista four times as long as antenna, with rather long pubescence; antennal segment 1 with no bristle on inner side as long as an interfrontal. Four pairs of small interfrontals. One moderate humeral; two postsutural dorsocentrals, between which there are eight rows of microchaetae anteriorly. Scutellum nearly semicircular, apical bristles longer than basal ones and nearly twice as long as posterior dorsocentrals. One small and one minute sternopleural. Fore legs with usual structure. Mid femur in male only with 7 to 8 short, moderately stout, posteroventral bristles along proximal two-thirds. Mid tibia with a dorsal bristle at one-third from base, surmounted by a smaller one, a dorsal and a somewhat smaller posterodorsal at four-fifths from base, surmounted by a small anterodorsal, and an apicoventral; in male, bristles on inside of tibia somewhat stouter and denser on distal half; basitarsus not long, with somewhat stout setae beneath. Hind legs normal, tarsal segment 2 markedly longer than first. Wings as in figure 8, *d*. Abdomen with very short bristles only. Male with genitalia large, anal split horseshoe-shaped, somewhat widening below where there are two longish bristles on each side, forceps short but wide, obtusely triangular, between them protrudes a long straight, dagger-shaped, pointed process with a black tip; sternite 5 with its hind margin straight

and fringed with moderately long setae, in central one-fourth with a black, asymmetrical, obliquely projecting black lamella. Female with one moderately long, rather stout and one finer bristle on each of cerci.

Holotype, male (US 66301), Yap, Kanif, July, Aug., 1950, Goss; allotype, female, same data. Paratypes: Male, Kanif, July 30, 1950, Goss; male, female, Yap, Dugor, July, Aug., 1950, Goss; male, Yap, Rumung I., at light, June 19, 1957, Sabrosky; female, Palau, Babelthuap, Ngaremelengui, at light, June 1, 1957, Sabrosky.

DISTRIBUTION: W. Caroline Is. (Palau, Yap).

I know of no other species in this subgenus which is almost entirely yellow. The venation is like that of the *L. clunipes* (Meigen) [= *crassimana* (Haliday)] group, but with the second costal sector rather shorter than the third, the alula is narrow, and the bristles of the mid tibia are not regularly paired. In Duda's key (1925, p. 153) it runs best to *L. opaca* Duda of East Africa but is quite different from that species in color and other details.

Subgenus **Trachyopella** Duda

Trachyopella Duda, 1918, Zool.-bot. Ges. Wien, Abh. **10**: 34.

Duda erected the subgenus *Trachyopella* for species of *Limosina* s.l. (=*Leptocera* s.l. at that time) with small hairy eyes, laterally directed antennae, and R_{4+5} always more or less strongly bent and overpassed by the costa. Later (1924, Konowia **3**: 5) he pointed out that *Limosina* s.s. was not sharply separated in this way, in particular some *Trachyopella* species having the eyes almost or quite bare, but that a new character may be used to separate *Trachyopella*. There is an additional row of outwardly directed bristles between the interfrontals and the superior orbitals (fig. 9, *a*). These bristles are absent in the subgenus *Limosina* Macquart (= *Scotophilella* Duda) but, somewhat similarly, in the subgenus *Elachisoma* Radi an extra row of bristles is also present between the interfrontals and superior orbitals but directed inward, not outward. Moreover, in *Elachisoma* the anal vein is abruptly sinuate, not regularly curved.

In addition to the true *Trachyopella*, there occurs in Micronesia a species with small bare eyes and only one or two bristles between the interfrontals and the superior orbitals (fig. 9, *b*). I propose to treat this species for the present as an outlying member of the subgenus *Trachyopella*.

17. Leptocera (Trachyopella) atomus (Rondani). (Figures 9, *a*; 10, *a*; 11.)

Elachisoma atomus Rondani, 1880, Soc. Ent. Ital., Bull. **12**: 19.

Limosina (*Trachyopella*) *atoma* Duda, 1918, Zool.-bot. Ges. Wien, Abh. **10**: 195.

Leptocera (*Trachyopella*) *atoma* Richards, 1930, Zool. Soc. Lond., Proc. **1930**: 306; 1946, Roy. Ent. Soc. London, Proc. B, **15**: 131.

A typical *Trachyopella* with densely hairy eyes and characteristic head bristles (fig. 9, *a*).

DISTRIBUTION: Europe, Canary Is., Madeira, Belgian Congo, Mariana Is.

S. MARIANA IS. GUAM: no data, Bohart. SAIPAN: As Mahetog area, Nov. 17, 1944, Dybas.

The specific name was originally a masculine noun and a change of genera does not alter the gender.

18. Leptocera (Trachyopella) obliqua Richards, n. sp. (figs. 9, *b*; 10, *b*; 12).

Male, female: Shining black; legs paler especially tibiae and tarsi; wings hyaline, halteres black. Length (with wings closed) about 1.4 mm.

Antennae widely separated and divaricate, segment 1 with an obvious forwardly directed bristle, segment 3 with dense whitish pubescence, arista four times as long as antenna, with long pubescence, nearly as long as pubescence of segment 3. Vibrissa long but all buccal bristles very short. Face with a strong but obtuse knob on upper half. Eyes bare, small, so that buccae at their narrowest are at least one-third vertical diameter. Frons, at most, a little shining but narrow strips from which interfrontal bristles arise

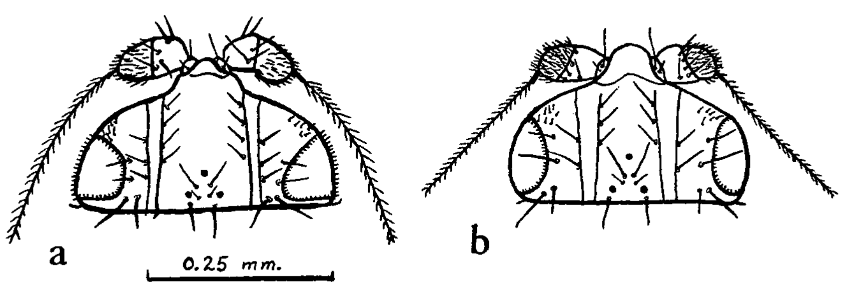


FIGURE 9.—Head, dorsal view: **a**, *Leptocera* (*T.*) *atomus;* **b**, *L.* (*T.*) *obliqua.*

and (narrowly separated from them) much wider lateral strips visible because of their different reflections; three pairs of small interfrontals and on lateral areas two outwardly directed superior orbitals near eyes and at level of posterior interfrontal (just in front of level of ocellar) another outwardly directed bristle halfway between interfrontal and superior orbitals; often a second similar, more anterior bristle. Thorax with one small humeral, one small posterior dorsocentral, on each side; 12 to 14 rows of microchaetes. Scutellum semicircular, bristles not long, apicals about as long as its basal width; one small and one minute sternopleural. Forelegs normal; mid tibia with anterodorsals at one-fourth and two-thirds from base and a pair of bristles (anterior one larger) at four-fifths, a mid ventral and a long apicoventral; basitarsus half as long as tibia, with fine setae beneath; hind legs normal, tibia with a short preapical dorsal bristle. Wings as in figure 10, *b*. Abdominal segments normal, with rather numerous short bristles, female cerci with two rather short, somewhat sinuous, hairs (fig. 12, *a, b*). Male with somewhat long bristles at sides of apex of fourth and especially fifth tergite; genitalia small, with no long bristles; however, in one alcoholic specimen some strong bristles curving upward can be seen on each side a little below anal split; beneath that again a pair of even thicker bristles curving inward, besides these a pair of small contiguous central processes and a pair of very large outer incurving forceps (fig. 12, *c*); sternite 5 with a rather deep emargination ending in a small projection on left side.

Holotype, male (US 66302), Ponape, Colonia, Agric. Expt. Sta., light trap, Jan. 6, 1953, Gressitt; allotype, female, Truk, Wena (Moen) I., 180 m., July 31, 1946, Townes. Paratypes:

S. MARIANA IS. GUAM: Two females, Oca Pt., on leaves and wood chips, May 28, 1945, June 2, 1945, Dybas. SAIPAN: Two males, two females, As Mahetog area, decaying banana stalks and leaves, Mar. 5, Apr. 22, 1945, Dybas; male, Sadog Talofofo, in decayed *Pandanus* fruit, Feb. 12, 1945, Dybas.

PALAU. KOROR: Female, Apr. 29, 1957, Sabrosky; female, July 26, 1956, McDaniel; male, female, SW Koror, light trap, 25 m., Dec. 4-5, 1952, Gressitt. BABELTHUAP: Two males, female, Ngiwal, May 20, 1957, Sabrosky.

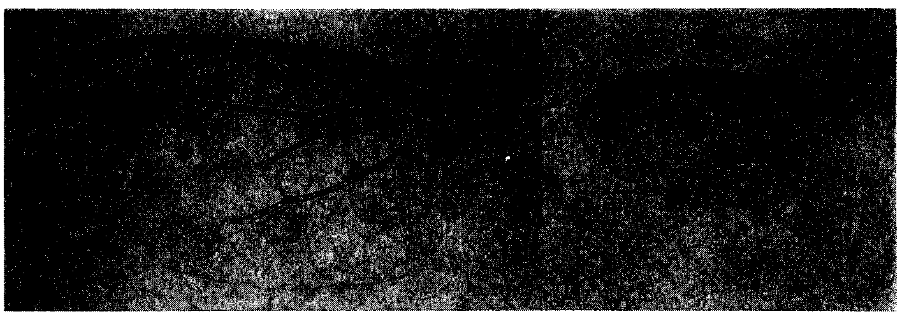


FIGURE 10.—Left wing: **a**, *Leptocera* (*T.*) *atomus;* **b**, *L.* (*T.*) *obliqua.*

YAP. E. MAP: Male, female, July-Aug. 1950, Goss.

TRUK. TOL: Male, Mt. Unibot, in litter, 10 m., Jan. 3, 1953, Gressitt.

PONAPE. Male, Colonia, reared from fruit of *Pithecellobium,* Jan. 21, 1953, Clarke.

DISTRIBUTION: S. Mariana Is., Caroline Is.

This is the anomalous species with bare eyes and one or two well-developed bristles between the interfrontal and superior orbital rows (fig. 9, *b*). The obliquity of R_{2+3} which runs almost parallel to the costa even where they join is also characteristic.

Eleven species of the subgenus *Trachyopella* Duda have been described; Collin (1954, Ent. Meddel. **27**: 57) mentions a species *"Lacteipennis"* but this appears to be a lapsus for *leucoptera* (Haliday). *L.* (*T.*) *ealensis* Vanschuytbroeck, 1951, is probably an *Elachisoma;* in any case R_{4+5} is not bent forward.

The following species have a narrow alula but differ from *L.* (*T.*) *obliqua* in having a dull mesoscutum, costal sector 2 not thickened and more or less distinctly shorter than the third, and eyes hairy: *L. atomus* (Rondani, 1880), *L. bovilla* (Collin, 1954), *L. coprina* (Duda, 1918) (= *melania* of Duda,

1938), *L. formosae* (Duda, 1925), *L. kuntzei* (Duda, 1918), *L. melania* (Haliday, 1836) (= *villeneuvii* of Duda, 1938).

L. (*T.*) *hyalinervis* (Duda, 1925) from Paraguay, has a shining mesoscutum and eyes not distinctly hairy; the second costal sector is not thickened and is equal in length to the third. The alula and the hind tibia were not visible in the unique type.

L. (*T.*) *leucoptera* (Haliday, 1836) of Europe and Africa has a shining mesoscutum, second costal sector distinctly longer than third, but very thick;

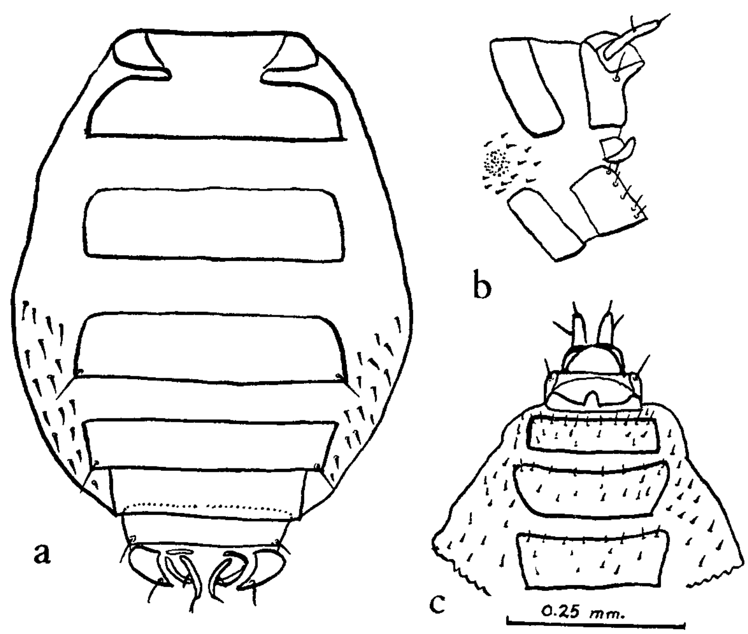


FIGURE 11.—*Leptocera* (*T.*) *atomus* abdomen, female: **a**, dorsal view; **b**, tip, left side; **c**, ventral view.

the alula is narrow, the hind tibia has a preapical dorsal bristle and abdomen has long bristles at the sides. However, the eyes are hairy, the head has the usual bristles of the subgenus, and the wings are whitish.

L. (*T.*) *minuscula* (Collin, 1956) from Great Britain has a shining mesoscutum, second costal sector thickened but hardly as long as the third, the alula is a little broader than in *L. leucoptera* and the eyes are bare. It has at least two strong bristles between the interfrontals and the orbitals.

L. (*T.*) *kertészi* (Duda, 1923) of Europe has a shining mesoscutum and bare eyes and generally similar venation, but R_{4+5} is much more strongly

bent, the alula is wide, the frontal bristles are typical, and there are more bristles on the hind tibia.

A female of *L. obliqua* from Palau seems to be no more than a variety. R_{2+3} does not run quite so close to the costa and there are some small bristles in front of the strong one between the interfrontals and orbitals. More material of both forms in good condition would be required to settle the status of this specimen. The one female was collected on southwest Koror, Palau, 25 m., light trap, Dec. 5, 1952, Gressitt. There are also two rather similar females from the Marshall Islands (Arno, Ine I., sweeping *Wedelia biflora,* June 21, 1950, La Rivers) in very bad condition. The venation resembles that of the previous variety but the mesoscutum is apparently dull.

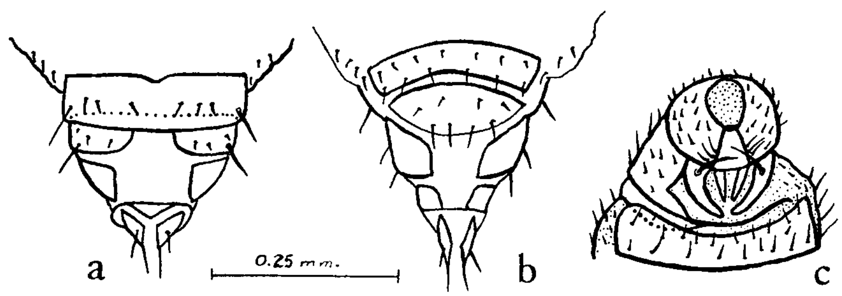


FIGURE 12.—*Leptocera* (*T.*) *obliqua,* tip of abdomen: **a**, female, dorsal view; **b**, female, ventral view; **c**, male, ventral view.

Subgenus **Coproica** Rondani

Coproica Rondani, 1861, Dipt. Ital. Prodr. **4**: 10.
Coprophila Duda, 1918, Zool.-bot. Ges. Wien, Abh. **10** (1): 45.
Leptocera (*Coproica*) Richards, 1960, Ann. Mag. Nat. Hist. XIII, **2**: 199.

This subgenus is recognized by the setulose surface of the scutellum and the angularly sinuate course of the anal vein (except in two North American species). It differs from the few species of *Rachispoda* which have a setulose scutellum in lacking the long upcurving bristle on the mid trochanter. The species of the subgenus were recently revised (Richards, 1960).

19. Leptocera (Coproica) ferruginata (Stenhammar).

Limosina ferruginata Stenhammer, 1854, K. Sven. Vet.-Akad., Handb., 397 (1853).

Leptocera (*Coprophila*) *ferruginata,* Spuler, 1925, Canadian Ent. **57**: 123, fig. 12.

Thorax more or less reddish, especially along line of dorsocentrals; three sternopleural bristles. Wing more or less dark, first costal sector with long bristles, second sector much longer than third, last part of R_{4+5} a little curved forward.

DISTRIBUTION: Europe, Africa, North and South America, North Atlantic Islands, S. Mariana Is. (Guam), Hawaii, Samoa, New Zealand.

S. MARIANA IS. GUAM: Five females, Fullaway.

This species is usually associated with stable manure, but was not collected on Guam by Bohart and Gressitt.

20. Leptocera (Coproica) vagans (Haliday).

Borborus vagans Haliday, 1833, Ent. Mag. **1**: 178.

Leptocera (*Coprophila*) *vagans*, Spuler, 1925, Canadian Ent. **57**: 123, fig. 11.

Black species. Thorax with two large, widely spaced sternopleural bristles. Wing with second costal sector much longer than third; unpigmented area of M_{1+2} produced to wing margin.

DISTRIBUTION: Europe, Canary Is., Belgian Congo, North and South America, Formosa, S. Mariana Is.

S. MARIANA IS. GUAM: Female, July 17, 1939, Oakley.

This species is usually associated with decaying vegetable matter, such as lawn mowings, but was not found on Guam by Bohart and Gressitt.

21. Leptocera (Coproica) hirtula (Rondani).

Limosina hirtula Rondani, 1880, Soc. Ent. Ital., Bull. **12**: 38.

Leptocera (*Coprophila*) *hirtula*, Duda, 1925, Archiv Naturgesch. **90A** (11): 206.

Black species. Wing with second costal sector not much longer than third; R_{4+5} ending on wing margin considerably farther in front of wing tip than production of M_{1+2} to margin would be behind it; veins R_{2+3} and R_{4+5} usually distinctly curved. Mid tibia with rather small posterodorsal bristles at basal one-fourth and center which are more or less paired with anterodorsal bristles; mid basitarsus ventrally with a pair of bristles, of which anterior one near base is smaller, and another longish one near middle. Thorax with discal setulae of scutellum all short. Female cerci with two long, sinuate hairs; male genitalia small.

DISTRIBUTION: Europe, Azores, Africa, Madagascar, Seychelle Is., North and South America, Malaya, Formosa, Micronesia, Hawaii, New Guinea, New Zealand.

BONIN IS: CHICHI JIMA: Five males, female, Omura, Sept. 18, 1934, Okabe.

S. MARIANA IS. SAIPAN: Female, As Mahetog area, at light, Apr. 1945, Dybas. GUAM: Three males, female, Agana, May 23, 1945.

PALAU. BABELTHUAP: Male, three females, Ngaremlengui, June 1-4, 1957, Sabrosky; one specimen, Koror, Nov. 24, 1947, Dybas; male, July 15-16, 1953, Beardsley; female, at light, Apr. 14, 1953, Beardsley.

YAP. YAP: Male, Aug. 1952, Krauss; 15 females, Giliman, pig pen, June 12, 1957, Sabrosky; female, Rumung, June 19, 1957, Sabrosky.

CAROLINE ATOLLS. KAPINGAMARANGI: Touhou I., male, on fresh fish, July 6, male, at lamp, July 18, 1954, Niering. SATAWAL: Female, Feb. 6, 1953, Beardsley.

MARSHALL IS. ARNO: Two females, Ine I., rat nest in *Pandanus,* June 26, 1950, and sweeping *Wedelia biflora,* June 21, 1950, La Rivers. JALUIT: Male, two females, Jabor I., fly traps with carrion and excrement, May 1, 1958, Gressitt. MAJURO: Male, two females, Uligor I., Aug., Sept. 1955, Wheeler.

GILBERT IS. ONOTOA: Three males, three females, Tanyah (Buiartun), at light, Aug. 3, 1951, Moul.

There is also a poorly mounted female from Saipan (1 mile north northeast, summit of Mt. Tagpochau, Jan. 11, 1945, Dybas) which is probably a form of *L. hirtula,* but it is somewhat larger and R_{4+5} is nearly straight.